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BRAKE DEVICE WITH AN ACTUATOR OPERATED BY A PRESSURE MEDIUM  
Specification

State of the Art

**[0001]** The invention relates to a brake device having an actuator, which is operated by a pressure medium, for the application and release of a vehicle brake, particularly of a rail vehicle brake, according to Claim 1.

**[0002]** From the state of the art, brake devices having pressure-medium-operated actuators are known where the brake is applied by the controlling of a pressure medium, such as compressed air, into the brake cylinder. This type of an active brake cylinder is used, for example, for the service brake of rail vehicles. Furthermore, pressure-medium-operated actuators with passive brake cylinders are known, where the application of the brake takes place by spring tension and the brake is released by the controlling-in of a pressure medium. Thus, despite a loss of pressure medium, such brakes are operable in the application direction and are used, for example, for parking or emergency brake devices of rail vehicles.

**[0003]** It is an object of the present invention to further develop a brake device having a pressure-medium-operated actuator such that the latter can have smaller dimensions and that the pressure medium consumption is reduced.

**[0004]** According to the invention, this object is achieved by the characteristics of Claim 1.

Advantages of the Invention:

**[0005]** Instead of releasing pressure medium into the environment for the reduction of pressure in the pressure chambers, a portion of the pressure medium present in the respective pressure chamber acted upon by pressure is guided into the other pressure chamber by opening the overflow valve and is utilized there for the pressure buildup. Pressure medium is therefore utilized several times and no longer has to be generated by the pressure medium source. This results in a lower pressure medium consumption of the pressure-medium-operated actuator and therefore in a pressure medium supply with smaller dimensions, particularly in smaller storage air tanks. As an alternative, while the dimensioning of the pressure medium supply is not changed, the size of the brake cylinder can be reduced in order to generate a defined braking or releasing force, because a portion

of the braking or releasing force is generated already by the amount of pressure medium flowing over from one pressure chamber into the other pressure chamber. This is advantageous particularly when the actuator is used in low-floor short-distance vehicles, in the case of which a limited amount of space is available for the brake cylinders. Furthermore, the valve cross-sections of the ventilation valves and bleeder valves can be reduced because only a portion of the pressure medium required for the application and for the release of the brake respectively still flows through them.

**[0006]** As a result of the measures indicated in the subclaims, advantageous further developments and improvements of the invention indicated in Claim 1 can be achieved.

**[0007]** According to a particularly preferred embodiment of the invention, the adjusting piston is spring-loaded in the direction of the application position. An initially described passive brake cylinder will then be obtained.

**[0008]** According to a further development, the overflow valve is opened until essentially a pressure balance exists between the two pressure chambers. The maximally possible overflow quantity of pressure medium can then be utilized for the pressure buildup in the other pressure chamber. The pressure balance valve is preferably opened so long that a fraction of a maximally reachable braking force or releasing force has been generated.

**[0009]** Preferably, ventilation and bleeder valves are provided for the ventilating and bleeding of the two pressure chambers, which are closed during the opening time of the overflow valve, a pressure buildup or pressure reduction taking place by the opening or closing of the ventilation or bleeder valves which exceeds the pressure balance in the two pressure chambers.

#### Drawings

**[00010]** An embodiment of the invention is illustrated in the drawings and will be explained in detail in the following description.

**[00011]** Figure 1 is a schematic representation of an actuator of a rail vehicle brake according to a preferred embodiment of the invention at the start of the braking;

**[00012]** Figure 2 is a view of the actuator of Figure 1 in an advanced braking phase;

**[00013]** Figure 3 is a view of the actuator of Figure 1 at the start of a release phase;

**[00014]** Figure 4 is a view of the actuator of Figure 1 in an advanced release phase.

#### DESCRIPTION OF THE EMBODIMENT

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OFFICE ACTION

V. Substantiated Determination According to Article 35(2)  
with Respect to the Novelty, the Inventive Activity and the  
Industrial Applicability; Documents and Declarations for  
Supporting This Determination

1. Determination

Novelty (N)	Yes: Claims 1-3
Inventive Activity (IS)	Yes: Claims 1-3
Industrial Applicability (IA)	Yes: Claims 1-3

2. Documents and Declarations

See Attached Page

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Concerning the Procedure:

1. State of the Art: An actuator for the application and release of a vehicle brake, wherein the adjusting piston is spring-loaded in the direction of the application position, is known, for example, from European Patent Document EP-A-1 086 867.

Object: Providing a braking device with a smaller-dimensioned pressure-medium-operated actuator with a lower pressure medium consumption. This is achieved particularly in that the two pressure chambers are mutually connected by a line having an overflow valve which is controlled according to the characterizing part of Claim 1. When the valve is opened, a pressure balancing can be achieved between the two pressure chambers.